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10/041,112	01/08/2002	Wipawan Yindeepol	P05122	4475

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EXAMINER

BAUMEISTER, BRADLEY W

ART UNIT

PAPER NUMBER

2815

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6

Please find below and/or attached an Office communication concerning this application or proceeding.

Final

# Office Action Summary

Application No.  
10/041,112

Applicant(s)  
Yindeepol et al.

Examiner  
B. William Baumeister

Art Unit  
2815



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on Dec 4, 2002.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1, 3-5, 7-9, 13, 15, 18, 21, and 24 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3-5, 7-9, 13, 15, 18, 21, and 24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on Dec 4, 2002 is: a) ☐ approved b) ☒ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

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## **DETAILED ACTION**

### ***Examiner's Amendment***

1. An examiner's amendment to the record appears below. The basis is that in the Amendment/response dated 11/27/2002 (paper #5) Applicant requested that two amendments be made to the specification and that various claims be canceled. However, these requests were set forth in the REMARKS section instead of the AMENDMENT section of the response as required by established Office policy. For the sake of customer service and compact prosecution, the Examiner held a telephone interview with Mr. Jurgen Vollrath on February 13, 2003 and confirmed that the stated changes were, in fact, intended and requested. Accordingly, the application has been amended as follows:

#### **IN THE SPECIFICATION:**

- a. Page 1, line 19, after "One": deleted [of the].
- b. Page 2, line 18: replaced "limited" with --limit--.

#### **IN THE CLAIMS:**

- c. Claims 2, 6, 10-12, 14, 16, 17, 19, 20, 22 and 23 are canceled.

### ***Drawings***

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

- a. Neither of FIGs 5 and 6 include a label for the depicted substrate oxide.

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3. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The above objections to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 3-5, 7 and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims.

Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex*

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*parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949).

In the present instance, claim 1 has been amended to recite the narrow recitation “a p-doped emitter region formed in a n-type tub...”, but the claim also retains its original recitation, “defining a p-n junction [between the p-doped or n-doped region] and the tub depending on the doping of the tub,” which is the broader statement of the range/limitation. It is unclear whether claim 1 requires that the tub be doped n-type.

b. The Examiner provisionally interprets claim 1 to have been intended to be further amended to delete the broader language so as to be commensurate with the amendments, but appropriate correction is required to confirm this interpretation.

### ***Claim Rejections - 35 USC § 103***

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Insofar as definite, claims 1, 3-5, 7-9, 13, 15, 18, 21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ibi et al. '766 in view of Cervin-Lawry et al. '722.

a. Ibi teaches conventional zener-zap diodes (see e.g., FIGs 1 and 2) wherein spaced-apart p and n regions 13/14 are formed in a p type well 12. Metal lines 15 are formed over the n and p regions so that a reverse breakdown voltage can be applied therebetween for adjusting the circuit resistance. The insulating regions 16-1 and 16-2 may be composed of either SiO<sub>2</sub> or SiN

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(col. 2, lines 61-) and the p and n dopant types may be reversed so that the tub 12 is n-doped (col. 4, lines 43-). Ibi does not disclose that silicided poly lines may be alternatively employed for the metal lines 15.

b. Cervin teaches that zener-zap antifuses that employ silicided 136/138 poly lines 118/120 that connect to respective p and n regions of a semiconductor substrate so that a reverse-bias can be employed thereacross to cause a silicide filament to extend fully between the poly lines to create a short or bridge. Cobalt may be employed as the refractory metal silicide (col. 4, line 52). Conductivity types may be reversed (col. 7, line 31-). The silicided lines may be employed in single or double poly processes (col. 7, line 18).

c. It would have been obvious to one of ordinary skill in the art at the time of the invention to have employed the silicided poly lines as taught by Cervin in the Ibi zap diode for the purpose of providing an anti fuse structure requiring a relatively lower programming voltage than afforded by metal interconnects as taught by Cervin (see e.g., BACKGROUND and the discussion of the prior art at col. 3 - ).

d. Regarding claim 8, while Cervin teaches that the particular insulating spacer 142 that separates the first and second poly lines of the double poly process is SiO<sub>2</sub> instead of the claimed SiN, as was stated above, Ibi teaches that such insulating layers may be composed of either SiO<sub>2</sub> or SiN. It would have been obvious to one of ordinary skill in the art at the time of the invention to have particularly employed SiN since this material possesses fewer pin-hole defects than does SiO<sub>2</sub>.

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e. Regarding claims 5 and 18, the following case law makes clear that in claims directed towards a product, it is the patentability of the final product *per se* which must be determined, no matter how actually made. Further, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or otherwise. *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also, *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wethheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al.*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964. **Note that in such cases, the burden is on applicant to prove that claim language relating to the method of making the device results in a structural difference over the prior art.** In the present case, the product-by-process doctrine is relevant to two portions of each of claims 5 and 18:

i. The claims set forth "two different polysilicon layers in a double poly process." The Examiner understands a double poly process to entail the formation of two poly regions in separate steps, respectively. However, it is less than certain whether "a double poly process" necessarily requires that the second poly region be formed in a position so as to vertically overlap the first poly region. As such, it is unclear whether such an implied spacial relationship necessarily follows from this method language. If not, then this method language would merit no patentable weight as it would not set forth any further structural limitations; as such, it would be immaterial whether the silicided poly lines 15-1 and 15-2 of Ibi as modified by

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Cervin were formed to be coplanar as taught by Ibi or overlapping as taught by Cervin (see poly lines 118 and 120).

However, assuming *arguendo* for the sake of compact prosecution that the recitation, “a double poly process,” necessarily includes the implicit structural limitation that the second poly line vertically overlaps the first poly line, the claims would nonetheless be rendered obvious because, as was explained above, Cervin teaches that it was known to employ such double poly processes so as to cause the two poly lines to overlap. It would have been obvious to one of ordinary skill in the art at the time of the invention to have formed the silicided zener zap diode structure of Ibi/Cervin as explained above through the use of a conventional double poly process such that the poly lines vertically overlap as taught by Cervin for the purpose of reducing and better controlling the lateral spacing of the p and n contact regions relative to a structure obtained by a lithographic process, thereby further reducing the voltage requirements as taught by Cervin (e.g., col. 4, lines 1-29).

ii. Claims 5 and 18 further set forth that the p and n dopants are obtained from the respective poly layers (i.e., by autodoping the substrate through annealing). Again, as autodoping relates only to the method by which the p and n dopant regions are formed, but does not provide any further structural limitations with respect to the final structure, the claim language warrants no patentable weight according to the product-by-process doctrine.



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8. Claims 5 and 18 are alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over Ibi/Cervin-Lawry as applied to the claims above, and further in view of Applicant's prior art admissions.

a. Assuming *arguendo* that the process of autodoping necessarily produces some structural feature that necessarily does not result from non-autodoping methods (e.g., perhaps, such as the resultant vertical or lateral dopant diffusion profile or the alignment of the diffused regions relative to the respective poly lines), Ibi would not teach diffused structures produced by autodoping in that its electrodes are composed of metal. Further, it is unclear whether the diffusion regions of Cervin are produced by autodoping since the reference only broadly states that the structure is produced by conventional methods.

b. Nonetheless, Applicant acknowledges that producing diffused regions from an autodoping process was conventionally known: "A common way of forming doped regions (in the case of the Figure 7 embodiment, n-extrinsic base 262 and p+ region 266 formed in tub 250) is by forming doped poly regions on the device (in this case poly regions 260 and 264) and annealing to cause dopant to enter into the tub to form the regions 262, 266." (REMARKS paper #5, page 6, response to previous 35 USC 112 rejection.) It would have been obvious to have employed an autodoping method--acknowledged to be conventional by Applicant--for forming the diffused p and n regions in the substrate for the purpose of simplifying the manufacturing process and thereby reducing cost by obviating the need for additional, separate substrate masking and doping steps.

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*Response to Arguments*

9. Applicant's arguments filed 11/27/2002 have been fully considered but they are not persuasive. Applicant has argued that the present invention is not rendered obvious by Ibi/Cervin because (1) Ibi is directed towards a simple diode structure and does not teach a double poly process; and (2) Cervin teaches a BJT structure that is different from Applicant's NPN transistor structure.

a. First, it is noted that whether Ibi teaches a structure that may result from "a double poly process" is immaterial since Cervin teaches a double poly process and provides motivation for why the use of it is desirable.

b. Second, Cervin is not being combined for the teaching of its particular NPN structure, but rather for its teachings of employing silicided poly in a zener zap diode and a double poly process (to the extent that such a process may constitute a structural limitation).

c. Regarding Applicant's "NPN transistor structure" and the amendments to the claims to include the terms "emitter" and "collector," the Examiner acknowledges the well-settled legal principle that an Applicant may be his or her own lexicographer. However, merely calling the embodiment of FIG 7 an NPN bipolar transistor or its p-doped region "an emitter" does not make it so. In fact, contrary to the assertions set forth in the REMARKS section, FIG 7 depicts and is directed towards a p-n diode.

Specifically, a bipolar transistor has an npn (or pnp) structure wherein the n-emitter and n-collector are fully separated by an interposed, oppositely-doped p-base. In the present case,

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Applicant's p-doped "emitter" layer 266 does not separate the n-doped "collector" substrate from the n-doped "base" region 262. Further, if p-region 266 alternatively did isolate n-region 262 from the n-substrate, the p-region would constitute a base region, not an emitter region. In any event, the structure, in fact, constitutes a p-n junction diode composed of p-anode 266 and n-cathode 262 that are separated by n-substrate region 250. This is exactly the same structure disclosed by Ibi (albeit with reversed dopant polarities, but both Ibi and Cervin reference the conventionally known fact that such devices may be produced with reversed polarities depending upon the specific application). As such, Ibi does teach the same breakdown-junction configuration.

### *Conclusion*

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however,

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will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

**INFORMATION ON HOW TO CONTACT THE USPTO**

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, **B. William Baumeister**, at (703) 306-9165. The examiner can normally be reached Monday through Friday, 8:30 a.m. to 5:00 p.m. If the Examiner is not available, the Examiner's supervisor, Mr. Eddie Lee, can be reached at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

A handwritten signature in black ink, appearing to read "B. William Baumeister". The signature is stylized with a large initial "B" and a long, sweeping horizontal line extending to the right.

B. William Baumeister

Patent Examiner, Art Unit 2815

February 13, 2003